REMARKS

Apparatus claims 21-36, previously subject to a restriction requirement and withdrawn from consideration, have been cancelled from this application while reserving the right to prosecute them in a divisional application.

Reconsideration by the Examiner is respectfully requested in light of the above amendments and the remarks which follow.

Claims 1-20 stand rejected under 35 USC 103(a) as being unpatentable over Japanese Patent 11-350255 or EP 586,924 and either one of PCT WO 90/13423 or Canadian Patent 2191072, all being newly cited references. The Examiner indicates that both the Japanese patent and the European patent teach forming a nonwoven web from bicomponent fibers containing a low melting point polymer such as polyethylene, with the webs being bonded by an embossing roller. The Examiner notes that these references do not teach using an embossing roller having a fluropolymer coating. However, the Examiner contends that incorporating a fluropolymer coating on the embossing roller used in the Japanese or European patent would have been obvious in view of the teachings of the Canadian patent or the PCT patent. The Examiner contends further that the processing temperature used in the embossing operation would have been determined through routine experimentation. Reconsideration by the Examiner and withdrawl of the rejection are respectfully solicited.

As was pointed out in the previous response, the present invention provides improvements in the ability to produce bonded nonwoven webs from melt extruded thermoplastic fibers or filaments, and in particular, it addresses a problem that is particularly significant to nonwoven fabric manufacturers attempting to produce nonwovens from lower melting polymer materials such as polyethylene. These lower melting polymer materials are in demand for use in nonwoven webs because they impart excellent softness properties to the fabrics. However, it is extremely difficult to bond these materials because there is a narrow "window" of conditions where acceptable bonding occurs.

In accordance with the present invention, it has been discovered that unexpected improvements in nonwoven fabric physical properties, such as tensile strength, abrasion resistance, and softness, are achieved by bonding the nonwoven web with a patterned embossing roll having an outer surface including raised calender lands spaced apart from one another by

intervening depressions, and where at least the depressions are covered by a surface coating of a fluropolymer.

The Gillespie declaration presented with the previous response demonstrated that through the use of the coated embossing roll, the temperature bonding window can be extended. The declaration further demonstrated that fabrics produced in accordance with the invention have improved abrasion resistance, as indicated by the ink rub test, and improved tensile strength without an objectionable loss of softness.

In the Official Action, the Examiner notes that that the unexpected increase in tensile strength and abrasion resistance appears to be related to the ability to process the web at higher processing temperatures, but the Examiner indicates that the claims are not commensurate in scope with the showing, in that the claims do not describe the operation of the embossing rollers at the specified temperatures.

In the amendments presented with this response, independent claims 1 and 10 have been amended to specify the temperature of the calender nip. This was already recited in independent claims 13 and 19. With these amendments, it is submitted that all of the claims now presented are clearly commensurate in scope with the showings made in the Gillespie declaration by specifying the temperature conditions under which bonding is carried out.

Claims 1 and 10 have also been amended to positively recite the unexpected and advantageous result of the present invention, namely to produce a fabric having improved abrasion resistance and strength as compared to a fabric bonded by an uncoated embossing roll. Support for this amendment is found in the specification at page 3, lines 29-31, page 4, line 30 – page 5, line 2 and page 11, line 28-page 12, line 2.

New dependent claim 37 and independent claim 38 define a further unique and advantageous aspect of the present invention. Through the use of a coated roll, and the resulting broadening of the effective bonding window, it is possible to operate the calender at temperatures higher than previously possible – including temperatures above the melting temperature of the lower melting polymer component of the fibers or filaments. See for example, the specification at page 11, line 28 to page 12, line 2. The prior art cited and relied upon by the Examiner does not teach nor remotely suggest this aspect of Applicants' invention.

The Examiner has pointed to the Hansen patent and the Lurken article to support the premise that embossing rollers were known to have been operated at temperatures up to 185 °C (365 °F). However, these references deal with traditional higher melting polymers such as polypropylene. While it may be known to operate embossing rollers at these temperatures for some kinds of fabrics, these references do not teach or remotely suggest that those temperatures can be used in bonding fibers from polymers that have a melting temperature below 140 °C. As applicant has previously pointed out, the use of softer, lower melting polymers (such as polyethylene) that melt below 140 °C present difficulties in bonding under commercial conditions because of the narrow bonding window where acceptable bonding conditions occur.

The Gillespie declaration points, for example, that applicant's normal commercial operating conditions for bonding a polyethylene sheath/polypropylene core bicomponent filament web using the traditional uncoated steel roll was 265 °F (129 °C). However, using the coated roll, the commercial production line was successfully operated at temperatures of 285 °F and 300 °F, and it would not have been possible to run the uncoated roll at this temperature.

With specific reference to the invention defined by independent claims 19 and 38, it should be noted that EP 586924, which the Examiner relies upon as a primary reference, does not teach a bicomponent fiber in which the sheath is a lower melting polymer such as polyethylene and the core is a higher melting polymer. In particular, in the sheath core bicomponent the filament shown in Figure 2b, polymer A, the sheath component, is polypropylene and polymer B, the core component, is polyethylene.

Turning more specifically to the prior art rejection, the Examiner acknowledges that the primary references relied upon in the rejection do not teach those skilled in the art to use an embossing roller with a fluoropolymer coating. The secondary references, namely PCT WO 90/13423 and Canadian patent 219072, while describing the use of a coated embossing roller, do not teach or suggest using such a roller in a process of bonding a nonwoven web of melt extruded thermoplastic fibers or filaments containing a polymer that melts below 140 °C., or more particularly a nonwoven web formed of sheath-core bicomponent fibers as claimed. The PCT published application involves flash-spun film-fibril sheets. As was noted in the previous response, this type of flash-spun nonwoven fabric is quite different from a nonwoven fabric made from melt extruded fibers or filaments. It has fundamentally different physical and tactile

properties, and the fabrics find utility in entirely different kinds of products than the nonwoven fabric processed by applicant's process. Consequently, nothing in this reference would incite or motivate the person of skill in the art to use the coated embossing roller of this reference in a process of bonding a fundamentally different kind of nonwoven fabric formed from melt extruded fibers or filaments. The references of record fail to establish a prima facie case of obviousness with respect to the process defined in the claims of record.

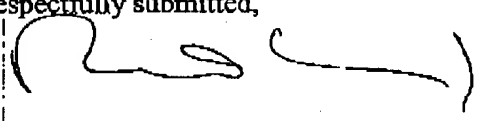
Furthermore, as noted above, applicant has demonstrated that the claimed process provides improvements in physical properties that are neither expected nor recognized in the cited prior art.

The Canadian patent, also relied upon as a secondary reference, is not even remotely related to the process claimed by applicant. It describes a stamping tool. This reference, considered singly or in combination with the primary references, does not lead persons of skill in the art to the invention claimed by applicant.

Accordingly, favorable reconsideration by the Examiner, withdrawal of the rejections, and formal notification of the allowability of Claims 1-20 and 37-38 as now presented are earnestly solicited.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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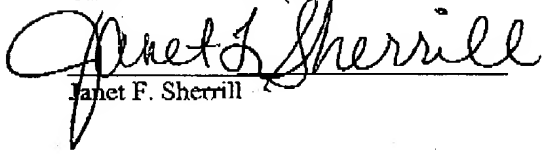

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